maggot gained this place by entering through the stigma from outside.

My investigations extend from April 1883 to June of this year, and are briefly summed up as follows:—

Udschimya sericaria appears generally in the middle of April, and attains maturity in the beginning of May, at the time when mulberry-trees expand their spring leaves. The female flies, flying in bushes of mulberry-trees during the months of May and June, deposit their eggs on the under surface of the leaves in close contact with the mid-rib, or else with the fine ramified veins.

The eggs are nearly oval in shape, tapering at one end, and rounded at the other. They are very small in size, measuring 0·18 mm. in length, and 0·13 mm. in breadth, and generally convex on the upper and flat on the under surface. The upper convex surface, which is coloured blackish-brown, has a lustre, and is marked out into hexagonal areas; while the lower flat surface, which is coloured grayish-brown, lacks lustre, and is only faintly marked out into hexagonal areas. The whole egg is enveloped with a sticky substance, which fixes it firmly with its flat side on the under surface of the leaves.

When the leaves on which the eggs are thus deposited are given to the silkworms, they eat them whole along with the leaves, without crushing them at all. At one to six hours after the eggs are taken, they are hatched out near either end of the digestive canal, and a tiny white maggot comes into existence. After a while the maggot passes out of the alimentary canal through the mucous membrane, with the aid of its horny hooked tooth and of setæ provided on each segment, and enters directly into one of the nervous ganglia found just under the digestive canal. A thin transparent membrane which envelops the ganglion becomes a protecting sac, inside which the maggot lives, and takes nerve-cells as its food. As it grows in size, this sac gradually enlarges, and finally rupturing, the maggot passes out into the body-cavity. At this time it measures five to six millimetres in length.

The maggot now seeks the main stem of the trachea, which forms a kind of chamber just inside the stigma of the silkworm, and enters into it by making an opening with its hooked tooth. It now sticks its head out into the body-cavity of the silkworm through the opening by which it entered, and takes fat as its food. Its posterior end, which is provided with two large spiracles, is directed towards the stigma, and thus the maggot respires the air which passes in through the latter.

As the maggot grows, this newly-formed chamber in which it rests also becomes larger, and the opening through which the anterior end of the maggot is projected out into the body-cavity of the silkworm becomes wider and wider, until the chamber assumes the shape of a cup Around this cup a large amount of fat is fixed by the maggot, probably with a watery fluid it secretes of alkaline reaction, and thus the wall of the cup increases in thickness and becomes very tough. The wall is always coloured dark brown, owing probably to the fæces of the parasite and to the action of the secretion upon the fat in the wall of the cup. In this position the maggot attains maturity; it then crawls out through an opening it makes at any portion of the body of its host. If, however, the growth of the maggot has been slow, it may be found in the trachea of the silkworm after it has changed into a pupa.

In either case, whether the larvæ or the pupæ have the parasite in the trachea, the space around the stigma, inside which the maggot is lodged, is always marked with a large dark brown patch, so that the presence of the maggot is easily recognised by looking at the stigma.

If a larva or a pupa of the silkworm is once infested by this parasite, its fate is sealed, and the cocoons made by the infested caterpillars are usually thin, and of much less value.

Those maggots which become mature in the pupæ of the silkworm crawl out of the cocoon by making a round opening at one pole, and such perforated cocoons are entirely useless for reeling silk.

The mature free maggot, coloured light yellow, is very active, and searching for the corner of the case in which they are kept, or crawling deep into the ground, changes soon into a black, cylindrical pupa. There the pupa rests through the winter, and in the following spring a perfected fly hatches out by breaking open the pupa-case.

A detailed account with suggestions for the remedies will soon be published in a *Memoir* of the University of Tokio.

C. SASAKI

University of Tokio, July

Singular Instance of Instinct

AMONG the insects very common to Victoria is one popularly known as the mason-fly. In form it is very like a gigantic hornet; the wings and legs are of an orange colour, as is also the abdomen, which is decorated with broad black stripes. It has a strange habit of building its nest, composed of tempered mud, in keyholes. Mr. Ellery, F.R.S., the Government Astronomer, tells me that this same fly often commences to build within the tubes of their astronomical instruments. The nest is rather peculiar. A layer of mud is first laid down, and a certain number of eggs are laid. Then follows another layer of mud; on this are deposited a number of young spiders, paralysed but not killed. Another layer of mud, more eggs, then mud, then spiders again, and so on, until the nest is complete. The spiders are evidently stored up as food for the grubs, as soon as hatched, an arrangement already known to naturalists. This fly has a very fierce aspect, and its nature evidently does not belie its looks. It flies about with great liveliness, and when alighting, its long black antennæ are kept in a state of constant motion. Its favourite food seems to be spiders, which it is in the habit of seeking for under the bark and in holes in the trunk of the Eucalyptus. It order to catch them it burrows under the loose bark, and in a few seconds generally issues forth again with some larger or smaller prey between its mandibles. The enormous bulk of some of the victims does not appear to intimidate it in the least. Even the gigantic so-called tarantula (vulgarly triantelope) is fearlessly attacked. I was one day walking through a suburban park near Melbourne, and saw one of these flies suddenly pounce down on the back of a large tarantula some five inches in breadth, measuring from the ends of the legs. The huge arachnidian succumbed at once. Resistance with an adversary in such a position was altogether out of the question, the only resource being to die, like Cæsar, becomingly. I watched the fight, or rather the murder, for some minutes, and then touching the assailant with the point of my umbrella, drove it away. It only flew, however, to a short distance, and then returned, flying so viciously round that I fully expected I should be attacked. By flourishing the umbrella, however, I again drove it off, and it retired to a distance of about a hundred feet. I then left the spider, but afterwards went back, and found the mason-fly following up his victory as energetically as ever. I drove it away again, left the spot, and again returned to find the murderous work still going on. This was repeated some half a dozen times, and at last, taking out a book, I sat down on a seat resolving to see what would happen. The fly did not reappear for nearly a quarter of an hour, and I thought it had altogether departed. A small ditch ran beside the pathway, and, turning my eyes in that direction, I noticed the mason-fly peeping through some blades of grass growing on the edge. It was evidently waiting for me to leave the spot in order to secure the full advantages of its victory.

It may be mentioned that the tarantula is a great coward. Some of our large spiders, if placed on an ants' nest, will "run amuck" through the crowd, nipping with their immense mandibles scores of their assailants who may approach them. They will do this several times in succession, and generally get away. The tarantula, however, if placed in such a position, yields at once, and, gathering up its long legs, expires with all dignity. I have tried the experiment many times, when a run of six inches would have secured the freedom of the tarantula, but even in these cases no effort was ever made to escape. One species of spider, living under the bark of trees, the skin of the abdomen of which is very soft, often proves a match for the ants, not by fighting, but by stratagem. He plays his enemies a thoroughly Parthian trick, throwing out a number of webs, which completely entangle them. This same spider, if thrown into a pool of water, similarly throws out threads of web, and, these being wafted to the shore, and adhering to an overhanging branch, enable the spider to reach the land. THOMAS HARRISON

244, Victoria Parade, East Melbourne, Victoria, July 9

Przevalsky's Horse

IT seems worth while to point out the close resemblance between the figure of this horse in NATURE for August 21 and those found incised on antlers in the cave of La Madelaine, copied in Dawkins' "Early Man." There is the same massive head, the same hog-mane, absence of forelock, pointed ears, short body, and powerful legs, while there seems even an indication that the long hairs of the tail spring first from the middle of that

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organ. In that from Cresswell Crags, as well as those from La Madelaine, the jaw is heavier than in the recent specimen.

Brosely, August 29 W. W. WATTS

"The Ores of Leadville"

MY attention has lately been drawn to a review in NATURE for April 17 of a work on "The Ores of Leadville and their Mode of Occurrence," by Mr. L. D. Ricketts, from which one would be led to suppose that all the facts mentioned were due to original investigation on the part of the author. Your reviewer does not state that which is acknowledged by the author himself, namely, that much of his information was obtained from the Report of the U.S. Geological Survey by Mr. S. F. Emmons, contained in the Second Annual Report, published a year previously.

A large atlas has lately been issued also by the U.S. Geological Survey completely illustrating the Leadville ore deposits, and an exhaustive monograph to accompany it is now in the printers' hands. I speak from an intimate knowledge of the subject, having taken part in the work, and should be much obliged by your inserting this correction without delay.

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AUSTRALIAN ORCHIDS

THE seventh and last part of vol. i. of Fitzgerald's "Australian Orchids," and the first part of vol. ii. have lately reached us. The testimony we bore to the value and merits of this work in our notice of part 5, vol. i. (NATURE, vol. xxii. p. 53) we can now repeat, and with emphasis, as we can base it on an examination of all the parts at present issued.

Mr. Fitzgerald is an ardent admirer and disciple of Darwin—indeed what true lover of orchids is not?—and his work is dedicated to his memory "as a token of the veneration in which he holds that great naturalist and fearless expounder of science." The synopsis shows that twenty-eight genera and 104 species are illustrated and described in vol. i., each part containing ten folio lithographic plates. The drawings and dissections leave nothing to be desired in point of fulness, completeness, and accuracy, the latter especially being far more numerous and varied than in any similar work we are acquainted with. There is one point on which those who are responsible for the nomenclature of Australian orchids are entitled to decided praise. All but one of the genera and 90 out of the 104 species in vol. i. bear really descriptive names, instead of being christened after "enterprising," or rather advertising, nurserymen or vanity-stricken cultivators, which is unfortunately the fate of most of the new orchids introduced into England. A large proportion of the orchids as yet described in this work are natives of New South Wales, but a few are contributed by Western Australia, Queensland, South Australia, and Tasmania. The enormous importance of insects to the maintenance of orchids is shown by the fact that, out of 104 species described in vol. i., ten only are self-fertilising. But the curious point is noted by the author that "self-fertilising species always produce a far greater proportion of seed." The difficulty with which some genera undergo fertilisation is illustrated by an instance given where a splendid plant of *Dendrobium Hillii* in the Sydney Botanic Gardens, freely open to insects, did not produce a single seed, though covered with about 40,000 flowers on 190 spikes! In another case mentioned by the author he found a small caterpillar on a flower of *Dendrobium speciosum*, which had partly eaten an adjoining flower. He marked the latter, and the flower so marked was the only one on the entire plant which produced seed. There is strong evidence that many species are dependent, not simply on insects, but on some particular, perhaps local, insect for fertilisation. *Sarcochilus parviflorus* often produces seed capsules in its native habitat, the Blue Mountains; if removed to Sydney, it flowers well, but does not produce seed unless artificially fertilised. One question discussed by the author is the fertility of hybrid orchids. We believe that this question has been settled in English plant-houses, where hybrids have been proved to be fertile in the case of one genus (Cypripedium) at all events. This result is what Mr. Fitzgerald anticipates, on account of the facility with which species of the same genus may be cross-fertilised, however far apparently they may be removed from one another. As he says, "a repugnance to intermixture does not exist in this family as it does in others."

While terrestrial orchids are very numerous in Australia, epiphytal orchids are comparatively rare. The latter are more ordinarily denizens of the hot and moist forests of tropical or sub-tropical regions. Thus not more than one-fifth of the species illustrated in Mr. Fitzgerald's work are epiphytal, and these belong almost entirely to the genera Sarcochilus and Dendrobium—the latter a genus of which there are probably two or three hundred species, mostly natives of Indo-Chinese regions, cultivated in this country. On the other hand, the author says:—"The centre of the terrestrial" (orchids) "may, I think, be placed in Sydney, where, within the radius of a mile, I have obtained 62 species of orchids, 57 of which were terrestrial—a number that could not, I believe, be equalled in any part of the world within a similar area."

The plates are accompanied by full descriptions giving curious and interesting details as to the methods of insect-fertilisation, and describing localities, surroundings, conditions of growth, &c. Notwithstanding the help derived from this source, Australian orchids have not, with some few exceptions, proved readily amenable to cultivation in this country. While it is comparatively easy to reproduce climates resembling those of the damp, shady, and hot valleys of the Amazon or of Burmah, or of the moist, cloud-covered, and cool slopes of the Andes or the Himalayas, it is very difficult to reproduce the dry, hot, and sunny conditions favourable to most of the terrestrial orchids of Australia. We shall therefore probably continue to know these for some time at least mainly from Mr. Fitzgerald's book. We doubt whether, excellent and obviously faithful as his drawings are, and carefully as they are coloured, the use of toned paper is judicious. It imparts a muddiness to the tints, as, for example, in the drawing of the beautiful Dendrobes, Phalænopsis, and Superbiens, part 7, vol. i., and part 1, vol. ii., where neither foliage nor flower have the clear bright colours natural to them.

Before concluding this notice of a work which devotes much attention to the curious and interesting study of orchid fertilisation, we might refer for a moment to the patience, care, and intelligence with which the raising of hybrid orchids is being prosecuted in this country, especially in the nursery of Messrs. James Veitch and Sons. In one genus, that of Cypripedium, the hybrids bids fair already to outnumber the known natural species, as well as to rival them in interest and beauty. The closely allied genera Cattleya and Lælia, which are distinguished only by the number of their pollen masses, have proved susceptible of cross-fertilisation, and have produced several intermediate hybrids of great beauty. It may well be said that patience is necessary for this work, for *Cattleya exoniensis*, the offspring of *Cattleya Mossiæ* and *Lælia purpurata*, did not flower until seventeen years after the seed had germinated. Even now it is only propagated by subdivision. The union of the genera Calanthe and Limatodes was more speedily fruitful; and the beautiful *Calanthe Veitchii*, especially valuable horticulturally, from its winter-flowering habit, is known in most gardens.

Few who have devoted themselves to the study or to the cultivation of orchids have failed to become greatly interested in this remarkable family. Their singular

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